God, Thou great symmetry,
Who put a biting lust in me
From whence my sorrows spring,
For all the frittered days
That I have spent in shapeless ways
Give me one perfect thing.

PALEONTOLOGY.—*A Paleocene mammalian fauna from central Utah.*[1] C. LEWIS GAZIN, U. S. National Museum.

In 1935, while making geological investigations in the region of the Wasatch Plateau in central Utah, for the U. S. Geological Survey, Dr. E. M. Spieker and Dr. J. B. Reeside, Jr., discovered dinosaur and indeterminable mammalian remains in beds which had heretofore been considered as "Wasatch" in age. As a result of these discoveries a Smithsonian Institution party in 1937, under the direction of Mr. C. W. Gilmore, and with the aid of Dr. Spieker, made a more thorough investigation of the beds with highly profitable results. In addition to material representing a variety of reptilian forms the party was successful in securing a number of more or less fragmentary specimens of Paleocene mammals. The latter were discovered in beds immediately overlying the Cretaceous dinosaur levels but lithologically a part of the same sequence which Dr. Spieker has named the North Horn formation. The mammal bearing level is in variegated beds in the upper part of the formation just below the Flagstaff limestone, the localities investigated being in the vicinity of North Horn Mountain, southwest of Price, Utah.

A study of the mammalian material, which includes 16 specimens having one or more teeth, indicates that the fauna is more recent than Puerco, though apparently older than Torrejon, as the faunas of these formations are known from the San Juan Basin in New Mexico. In addition to a crocodile, six mammalian forms are distinguished in the collection. These are as follows:

INSECTIVORA
Aphronorus simpsoni, n. sp.
Insectivore?, gen. & sp. undet.
CARNIVORA
Protogonodon? spiekeri, n. sp.
Chriacus? sp.

[1] Published by permission of the Secretary, Smithsonian Institution. Received March 23, 1938.

TALIGRADA
Periptychus gilmorei, n. sp.
CONDYLARTHRA
Hyopsodont, gen. & sp. undet.

The presence of *Aphronorus* and a hyopsodont, which is near *Litaletes*, in the fauna suggests a relationship with the Crazy Mountain Fort Union fauna but as these forms are known only from the Fort Union facies little can be said concerning their development or geologic range.

The principal evidence for the age of the fauna is found in the material of *Periptychus gilmorei* and *Protogonodon? spiekeri.* These forms represent better known groups whose geologic history is somewhat better understood. The periptychid is clearly intermediate in almost all characters between *Carsioptychus coarctatus* of the Puerco and *Periptychus carinidens* of the Torrejon. Similarly, the large creodont is intermediate between *Protogonodon pentacus* and *Claenodon corrugatus* (*C. ferox*) of the two San Juan horizons. This interpretation is not entirely conclusive as the relationship can be established only after a greater representation of the fauna is known, but from the material at hand an age intermediate between Puerco and Torrejon seems evident.

Inasmuch as it seems desirable to use a separate name to designate this fauna, for distinguishing it from the underlying Cretaceous dinosaurian fauna, and from other Paleocene faunas, the writer proposes the name Dragon (suggested by Dr. Spieker), from the canyon in which the fossils were found. The writer fully recognizes the difficulties which would be encountered in attempting to define on a lithologic basis the beds in which this Paleocene fauna occurs. Field work by Dr. Spieker has shown that the North Horn formation is a lithologic unit in which no disconformity or other structural evidence is apparent on which one can satisfactorily separate the two sets of beds. A marked interval of time between the two faunas is indicated, however, and similar situations are known to exist in the relations between other successive faunal zones, such as between the classic horizons, Puerco and Torrejon, in the San Juan Basin of New Mexico. Hence, it is not without precedent that a geographic name is used to designate a fauna, if only to serve as a handle for paleontological use.

The writer wishes to acknowledge the courtesy extended by Dr. G. G. Simpson in making helpful suggestions and in permitting comparisons with Paleocene materials in the American Museum.

SYSTEMATIC DESCRIPTION OF MATERIAL

INSECTIVORA

Aphronorus simpsoni, n. sp.

Holotype.—Left ramus of mandible, U.S.N.M., no. 15539, with P_4–M_3 (Fig. 1).

Locality.—N. W. $\frac{1}{4}$ sec. 8, T. 19 S., R. 6 E., Emery County, Utah.

Horizon.—Dragon, Paleocene.

Specific characters.—Ramus slightly deeper than in *Aphronorus fraudator*. Teeth relatively more slender in anterior portion. Posterior teeth relatively larger. Posterior wall of trigonid in molars directed slightly more forward externally.

Description.—*Aphronorus simpsoni* is close in size to *A. fraudator* Simpson from the Crazy Mountain Fort Union, but differs from this species in certain relative proportions which are outside the limits given by Simpson for the middle Paleocene form. The ramus is slightly deeper than in the several

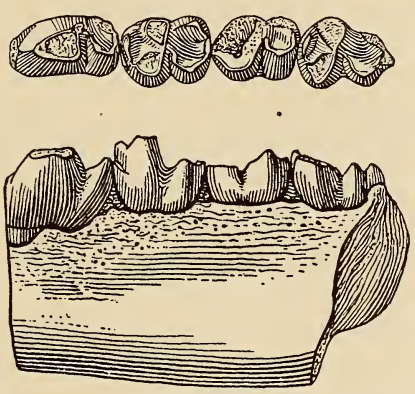

Fig. 1.—*Aphronorus simpsoni*, n. sp. Left ramus of mandible with P_4-M_3, type specimen, U.S.N.M. No. 15539. Lateral and occlusal views. ×4. Dragon Paleocene, Utah. Drawing by Sydney Prentice.

Fort Union specimens which the writer examined, a difference which is more noticeable in the posterior portion. Also, the posterior molars are relatively larger, particularly M_3, which is larger than in any of the Fort Union specimens examined. However, the teeth are relatively slender. This is most noticeable in P_4 which combines the greatest length with the least width given by Simpson for *A. fraudator*. Moreover, the posterior wall or shear of the trigonid in the molars is not so distinctly transverse, but directed slightly more forward externally. In P_4 the shear is more nearly transverse though somewhat irregular as a slight ridge extends down the posterior wall of the metaconid and unites with the hypoconid crest.

In addition to the holotype there are three isolated lower teeth, which are tentatively referred to this species.

Insectivore?, gen. & sp. undet.

A jaw fragment with only M_3 preserved may represent a second insectivore in the fauna. The tooth is about the size of that in *Aphronorus simpsoni*

TABLE 1.—MEASUREMENTS OF LOWER TEETH OF *Aphronorus simpsoni*

	P_4	M_1	M_2	M_3
Anteroposterior diameter	3.8 mm.	3.0	3.0	3.2
Transverse diameter	2.0	2.1	2.2?	2.2

but shows a somewhat different construction. The hypoconid and hypoconulid are more widely separated and a slight cingulum is present around the outer wall from about the parastylid to the hypoconulid. The tooth is not greatly different from that in the Puerco hyopsodont, *Oxyacodon priscilla*, but the paraconid is placed too far lingually and the hypoconulid is not so well developed.

CARNIVORA

Protogonodon? spiekeri, n. sp.

Holotype.—Right ramus of mandible, U.S.N.M. no. 15538, with M_1, M_2 and part of M_3 (Fig. 2).

Locality.—N. W. $\frac{1}{4}$ sec. 8, T. 19 S., R. 6 E., Emery County, Utah.

Horizon.—Dragon, Paleocene.

Specific characters.—Size about that of *Protogonodon pentacus*. Enamel on molars more rugose. Paraconid in M_1 and M_2 more lingual in position and slightly less distinct from metaconid. Entoconid apparently more distinct from hypoconulid in M_1 to M_3.

Description.—The lower molars of *Protogonodon? spiekeri* correspond closely in size to those of *P. pentacus* from the Puerco, but exhibit more rugose enamel. The paraconid, which is preserved in only the first two molars, is more lingual in position and not so distinct from the metaconid. However, the cusps around the talonid, though low, are somewhat more distinct from those adjacent than in *P. pentacus*, with less development of a crest and basin. The trigonid portions of the teeth are somewhat more elevated with respect to the talonids than is usual in *P. pentacus*.

In the reduction and position of the paraconid and in the rugosity of the enamel the Dragon form makes a definite approach toward the condition seen in the Torrejon specimens referred to *Claenodon corrugatus* (*C. ferox*). The paraconid in M_2, and perhaps M_1, of *Protogonodon? spiekeri* is better developed and more distinctly separated from the metaconid than in *C. corrugatus* although it is placed nearly as far lingually as in the Torrejon material. The union or ridge between the protoconid and metaconid is simple and not double as frequently seen in the more coarsely rugose teeth of *Claenodon corrugatus*. On the talonid the hypoconulid is more distinct from the entoconid, whereas in *Claenodon corrugatus* these two form a more conspicuous ridge which usually continues with the cingulum around the hypoconid. The cusps in general are lower and more distinct than in *Claenodon*, with a less distinctly basined talonid, with fewer accessory cuspules, and a finer quality of rugosity.

M_3, though incomplete, is much less elongate than in *C. corrugatus*, as indicated by the spacing of the metaconid, entoconid, and hypoconulid.

A maxillary fragment with part of M^3 and the root portion of M^2 shows no important characters other than a relatively great difference in size between these two teeth.

In most respects, especially in the character of the trigonid of the lower

molars, *P.? spiekeri* stands in a relation nearly intermediate between *Protogonodon* and *Claenodon*, with perhaps a slightly greater resemblance to *Protogonodon*. It is distinct from the Fort Union *Deuterogonodon montanus*, as represented by the paratype, in the lowness of the cusps, the far less developed crest and basin of the talonid, and in the relatively greater importance of the entoconid as compared with the hypoconulid.

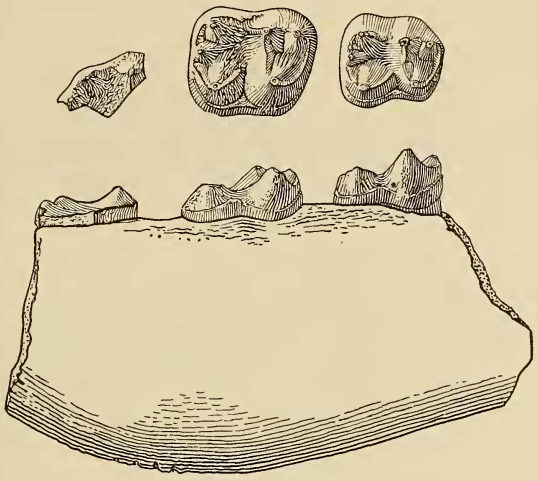

Fig. 2.—*Protogonodon? spiekeri*, n. sp. Right ramus of mandible with M_1, M_2, and part of M_3, type specimen, U.S.N.M. No. 15538. Lateral and occlusal views. ×1½. Dragon Paleocene, Utah. Drawing by Sydney Prentice.

The anteroposterior diameters of the first and second lower molars are 10 and 11 mm respectively. The transverse diameters are 8 and 9.3 mm.

Chriacus? sp.

An isolated second upper molar and a maxillary fragment with a well worn first molar and part of the second represent an oxyclaenid carnivore, apparently near *Chriacus*. The teeth are about the size of those in *Chriacus baldwini*. The cusps are somewhat more conical than in *Chriacus* though not so rounded as in *Tricentes*. The inner portion of the isolated tooth shows a moderately developed hypocone, more lingual in position than in *Tricentes*, and a slight protostyle. The cingulum is interrupted for a very short distance between the hypocone and the protostyle. The protoconule and metaconule are less markedly joined to the paracone and metacone respectively than in *Chriacus* or *Metachriacus*. The Utah material is near that of *Metachriacus* but the cingulum is not so developed around the protocone as in the Fort Union form.

TALIGRADA

Periptychus gilmorei, n. sp.

Holotype.—Right and left maxillae, U.S.N.M. no. 15537, with cheek teeth P^2–M^3 (Fig. 3).

Locality.—N. W. ¼ sec. 8, T. 19 S., R. 6 E., Emery County, Utah.

Horizon.—Dragon, Paleocene.

Specific characters.—Size near that of *Periptychus carinidens*. Upper cheek teeth relatively wider. Lingual portion of upper premolars somewhat more constricted anteroposteriorly. Lingual wall of premolars and molars more gently sloping. External cingulum of molars better developed and cusps closer together. Inner crescent of upper premolars more fully developed than in *Carsioptychus coarctatus*. Apparently the talonids of the lower premolars (as indicated by a referred specimen) are better developed than in *C. coarctatus*.

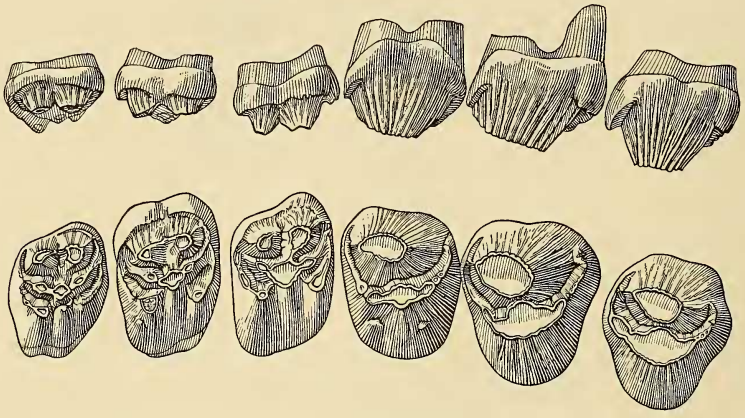

Fig. 3.—*Periptychus gilmorei*, n. sp. Right maxilla with P^2-M^3, type specimen, U.S.N.M. No. 15537. Lateral and occlusal views. ×1½. Dragon Paleocene, Utah. Drawing by Sydney Prentice.

Description.—*Periptychus gilmorei* is intermediate between *Carsioptychus coarctatus* from the Puerco and *Periptychus carinidens* from the Torrejon in almost all characters of the upper dentition. The teeth are relatively wide transversely as compared with their length and the premolars are only slightly larger than the molars. The premolars show the inner crescent developed almost as much as in *Periptychus carinidens* but the deuterocone portion is more constricted anteroposteriorly although not so much as in *Carsioptychus coarctatus*. Moreover, P^2 is much more like that in *Periptychus* than the simple condition observed in several specimens of *Carsioptychus*.

The molar teeth show a distinct resemblance to those in *Carsioptychus*, and in addition to their being relatively wide transversely, show a more distinct external cingulum than in *Periptychus*. The hypocone and protostyle have a somewhat more lingual position and the lingual walls of the molars (and premolars as well) appear to be more gently sloping than in *Periptychus*. The cusps and cuspules are somewhat less widely spaced than in *P. carinidens*, particularly the protoconule and metaconule which are located very close to the protocone.

An additional feature in *Periptychus gilmorei*, but probably of no importance is the very slight development of a "protostyle" and "hypocone" on P^4. This was not observed in any of the Puerco or Torrejon material. Also, the third molar, on the right side only, is peculiar in that the lingual wall exhibits a cuspule median to the protocone, between the protostyle and hypocone.

In an incomplete, isolated, lower premolar from the Utah locality, prob-

ably representing *Periptychus gilmorei*, the development of the cusps on the talonid is more suggestive of *Periptychus* than of *Carsioptychus*.

TABLE 2.—MEASUREMENTS OF UPPER DENTITION OF *Periptychus gilmorei*

	P^2	P^3	P^4	M^1	M^2	M^3
Anteroposterior diameter	11.6 mm.	11.7	10.5	9.2	9.5	8.8
Transverse diameter*	12.7	14.6	14.0	14.2	14.1	11.1

* The transverse diameter is taken from the external cingulum to the base of the enamel lingually and at right angles to the direction of the tooth row.

CONDYLARTHRA

Hyopsodont, gen. & sp. undet.

Four isolated lower jaw fragments with one tooth each and a fifth specimen including two upper teeth and some parts of associated (?) lower teeth represent a hyopsodont condylarth related to *Ellipsodon*. The form probably represents a new genus near *Litaletes*, but the material is too fragmentary to permit adequate description.

The two upper teeth, apparently M^1 and M^2, both exhibit a distinct hypocone, which in M^2 is markedly lingual in position. Also, in M^2 there is a slight protostyle and the cingulum is almost continuous around the inner wall of the tooth. M^1 is somewhat smaller and relatively narrower transversely, does not have a protostyle, and the cingulum does not extend around on the lingual surface. The two upper molars resemble those in *Litaletes disjunctus* but the protocone, paracone, and metacone are somewhat more widely separated. Moreover, the more lingual position of the hypocone, the extent of the cingulum, and the presence of the protostyle in M^2 distinguish it from *Litaletes*. The anteroexternal and posteroexternal angles of the two upper molars are developed more as in *Litaletes* than as in *Ellipsodon*.

In the lower molars the paraconid is lingual in position as in *Ellipsodon, Litaletes, Mioclaenus, Choeroclaenus*, and *Tiznatzinia;* not as in *Protoselene, Oxyacodon* and *others*. The lower molars are much as in *Ellipsodon lemuroides* in size and appearance but with the protoconid and metaconid farther apart and the talonid somewhat less deeply basined.

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